THE METAL INDUSTRY

With which is Incorporated The Aluminum World.

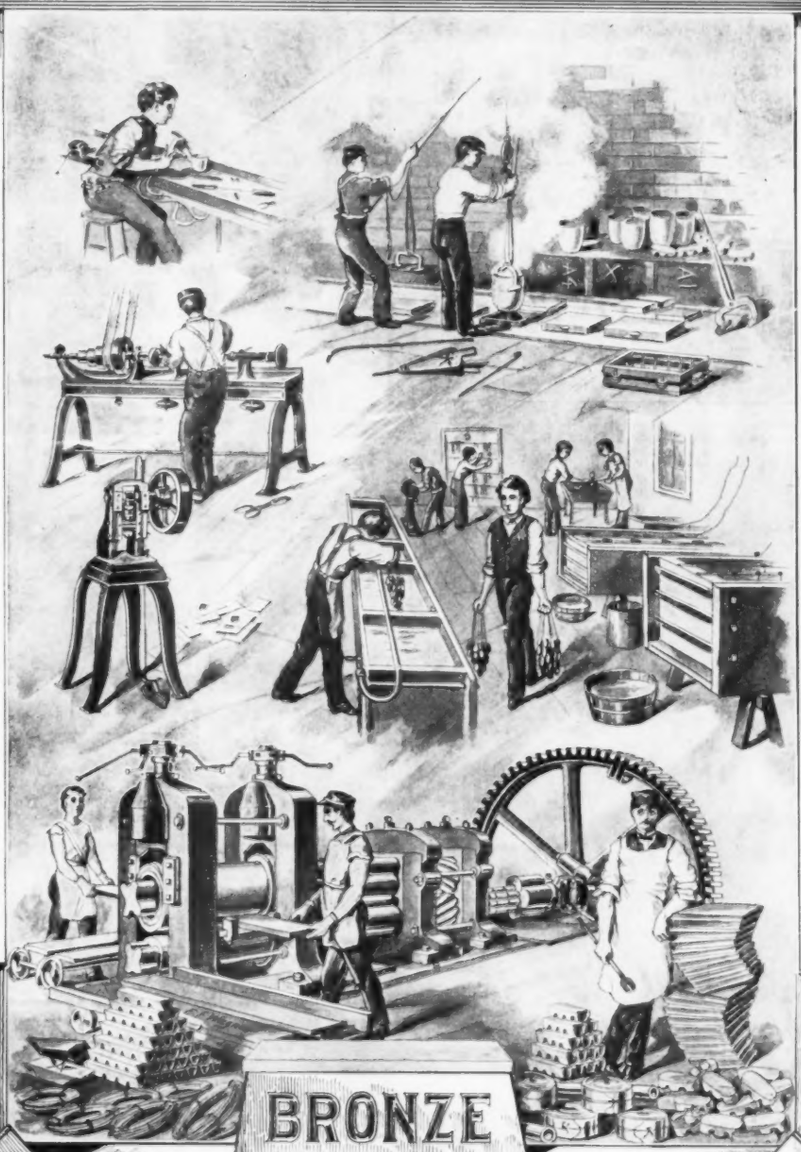
The Brass Founder and Finisher and Electro Platers Review.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

ALUMINUM · COPPER · NICKEL · TIN · SILVER · LEAD · GOLD · ZINC

METALLOGRAPHY · BRASS · METALLURGY

MELTING · CASTING · ROLLING · DRAWING · STAMPING · TURNING · MILLING · PUNCHING · SAWING · FILING · SOLDERING · BRAZING · PLATING · GILDING · BRONZING · POLISHING · ETCHING · ENGRAVING



BRONZE

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THE METAL INDUSTRY AND THE ALUMINUM WORLD AND THE BRASS FOUNDER AND FINISHER AND ELECTRO PLATERS REVIEW

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PURE MANGANESE.

Year by year the list of what may be called rare metals is growing less and many of those which were formerly classed among them are now articles of every-day use. Aluminum used to be quoted as illustrating a case in point, and within still more recent years other metals, such as chromium, tungsten, molybdenum, etc., have joined the list of the commercially valuable metals. Every year also sees a growing tendency on the part of the metallurgist as producer to supply and as consumer to demand metals of a high state of purity, unheard of in former years. Manganese, while not properly coming within the category of rare metals, yet was very difficult and expensive to obtain in a reasonably pure state by ordinary metallurgical means, on account of its high melting point and its liability to volatilize. The melting point of the metal has recently been re-determined and found to be 2241° F. The custom has been among metal workers to add the metal to other alloys they wanted to produce in the form of its alloy with iron, ferro-manganese, a product of the iron blast furnace. Ferro-manganese contains a considerable percentage of carbon and can be obtained with a maximum of about 80 per cent. of manganese, in which case it contains from 8 to 9 per cent. of iron. For the best grade of work, in order to reach absolute uniformity, the presence of iron is, however, objectionable and the pure metal should be used. The latter alloys quite easily with the metals usually employed by the metal founder, copper, zinc, tin, nickel, aluminum, etc. Within recent years such pure metal has been obtainable in the market as a product of 99 per cent. purity, practically free from iron and carbon. It is produced by aluminothermic methods, that is the metal is reduced from its oxide not by carbon as is usually the case in metallurgical practice, but by metallic aluminum in the shape of powder. The oxide is mixed with the metallic aluminum and the mixture is ignited at one point by setting fire to a small heap of a mixture which is easily inflammable, such as barium peroxide and powdered aluminum. On account of the large amount of heat which is given out when the reduction takes place, the combustion starts at one point and quickly spreads throughout the mass, so that the charge of the crucible, in which the operation is performed, is at a very high temperature and

melted in a very short time. The metallic manganese is at the bottom of the crucible, while the slag, which consists of molten alumina, swims on top.

Considerable quantities of pure manganese are now made in this manner. The metal, contrary to that obtained by reduction with carbon, which rapidly oxidizes on exposure to the air, resists the action of the atmosphere, is quite brittle and can easily be broken up with a hammer. A high grade copper alloy is easily prepared by melting the copper in a graphite crucible and after carefully removing the dross, adding the manganese in rather coarse pieces, about the size of a hazel nut. The addition should be made at intervals of from 5 to 10 minutes, sufficient time being allowed for a thorough incorporation of the metal, which is aided by giving the bath a good stirring after each addition of metal. If it is desired to produce a 20 per cent. alloy, the bath should be heated for an hour, while a 30 to 50 per cent. charge requires at least 1½ hours, the bath being stirred from time to time. The resulting alloy can either be cast in the form of flat rods, which are afterwards cut up, or it may be granulated. Owing to its high purity, the metal ought to prove a very valuable material for high grade work in the metal foundry, and we look forward to see its use increasing at no distant date among the more progressive part of the fraternity.

ANTIDOTE FOR CYANIDE POISONING.

In our February issue we called attention to the extremely poisonous nature of potassium cyanide in commenting upon the death of two workmen from cyanide poisoning in an electroplating establishment in Providence, R. I.

In all cases of accidents due to potassium cyanide it is therefore absolutely essential, that an antidote be administered with the utmost dispatch and medical aid be procured as quickly as possible. The ingredients required to make up the antidote should be procured by the employer and kept in an easily accessible place, due precaution being taken to have the receptacles, in which they are contained, plainly marked and of a different color, so as to prevent mistakes during the excitement which usually follows an accident.

Various antidotes have been proposed, but according to recent exhaustive experiments by a medical committee appointed by the Chemical, Metallurgical and Mining Society of South Africa, alkaline ferrous sulphate is the best. The doses recommended consists of 30 cubic centimeters (1.83 cub. in.) of a 23 per cent. solution of ferrous sulphate, 30 cubic centimeters of a 5 per cent. solution of caustic potash and 2 grams (30.86 grains) of powdered oxide of magnesium (light). The ferrous sulphate is kept in a blue bottle, the caustic potash in a white bottle, and the magnesia in a little package, a small basin and a spoon are provided, so that all that has to be done in case of an accident, is to pour the contents of the two bottles and the package into the basin, stir with the spoon and administer the mixture to the patient.

The above quantities are sufficient to neutralize a greater quantity of potassium cyanide than is ever likely to be taken by accident. If the patient is conscious, he should swallow the mixture at once and rest quietly for a few minutes. If he is not conscious, he should be placed on his back and the mixture poured down his throat in small quantities, his nose being pinched if necessary to cause him to swallow the antidote. Medical assistance should, of course, be summoned immediately. After administering the antidote the patient should be made to vomit, either by tickling his throat or by administering a tumblerful of warm mustard and water to him. In view of the extremely poisonous character of potassium cyanide and the fatal results, which quickly follow its introduction into the system, the posting of directions in the various rooms in which cyanide is handled, instructing the employees as to the preparation and administration of the above antidote, is to be highly recommended. This might be the means of saving lives, which might otherwise be lost, owing to medical assistance not arriving until too late. A dose as above, if administered in time, has been found to be absolutely effective.

ALUMINUM BOBBINS IN TEXTILE MILLS.

Aluminum is stated to have recently been employed with excellent results to replace the wooden bobbins of which such an enormous number is used in the textile industries. The wooden bobbins are cheap and easily worked. They have, however, the disadvantage of being affected by variations in temperature and by moisture, which facts are especially objectionable in spinning mills where the air is apt to be heavily charged with humidity and where the bobbins are liable to revolve in an irregular manner. This oftentimes causes jerks which break the thread. By the substitution of aluminum for wood these objections are eliminated, inasmuch as aluminum bobbins run true in any temperature existing in the mill as well as in any degree of humidity. Furthermore, they are much lighter than wood, and in consequence the spindles upon which they are sitting can be run faster than can be done with wooden bobbins. If the machines are run at the same speed as they were when wooden bobbins were used, a saving in the power required to drive them is effected.

In comparing the production of silver plated goods made in the United States with those produced in England, Mr. Arthur Bradshaw, of Meriden, Conn., stated in a recent interview with *The Washington Post* that our country excels in the manufacture of these goods. The designs particularly are much superior, he says. There is no style about the wares of the old countries. He says the plated wares in foreign countries can easily be dis- the United States can scarcely be told from the solid article.

MODERN PLATING INSTALLATIONS.*

By W. Pfanhauser, Ph.D.

With the increase in the capacity of electrolytic dynamos the electroplating methods were led into different channels, so that to-day we find large establishments which can stand comparison with any other branch of manufacturing in regard to extent as well as rentability. Probably in few fields so much has been sinned than has been done in the electroplating business, for many people have tried to exploit processes and methods which had not the slightest claim to practicability, though they often were offered for incredible prices. Installations have often been made, the view of which fills the expert with more than wonder. By discussing in the following some modern plants, I want to show how electroplating installations have to be made.

In the foreground of interest stands for some time the electrogalvanizing of iron, and the installations for that purpose are pushing out the old method of galvanizing, as far as size and rentability is concerned. It is a pity that on account of the unbusinesslike proceeding of such electrogalvanizing establishments this method has been brought into discredit and very often did I hear the question in my practice: Is electrogalvanizing really proof against rust and equal to hot galvanizing? To this question I can only answer that electrogalvanizing is at least equal, if not preferable, to hot galvanizing, but the manufacturers should not want to make more money than can be legitimately made already. It must not be believed that the iron is proof against rust, if it only shows the color of the zinc. The deposit must have a certain thickness and it must be quite homogeneous. Even thicker layers of zinc may not be rust proof, if the galvanizing has been badly executed and if, for instance, galvanizing solutions are used which apparently furnish a good-looking deposit, the structure of which, however, is absolutely not satisfactory. The main condition is a deposit which is completely coherent and which evenly covers the whole surface of the object to be galvanized, not a network of zinc crystals. The principal mistake is made by endeavoring to be economical with the zinc, and taking layers of less than 0.0000394 inch thickness as the normal ones as being rust proof. At times such a layer is represented as normal by people who install such plants, and I cannot see why opposition has not been made before this to such practice. It may be true that a piece of sheet iron does not rust after it has received such a thin layer of zinc if it is exposed to pure air. But if smoke or acid vapors come in contact with it, as in manufacturing plants, railroads, etc., such a thin deposit disappears soon and the iron rusts quicker than if it had been only covered with lacquer. In order to produce a good, lasting coat care has to be taken that at least about one-half ounce of zinc is deposited per square foot, and such layers can be obtained in 30 to 35 minutes with a normal current density of 14 to 20 amperes per square foot of surface.

Based on these data is a plant in Silesia, Germany, which is driven by a 240-volt direct current motor, running the working dynamo of 2,500 amperes at 5 volts. The electroplating solution consists of a solution of zinc sulphate acidified with sulphuric acid. The tanks are of wood and placed in the ground. They are about 13 feet long and of corresponding width and depth. Pickling is performed by sulphuric acid and subsequent rubbing. The long corrugated sheets thus prepared are put into the bath, in which they are supported by special clamping devices. The deposited zinc is made bright by a machine specially constructed for this purpose and is then dried in a furnace.

The galvanizing of objects with irregular surface presented great difficulties for a long time. These have been overcome by an alkaline electrolyte, which serves the purpose of producing first an even zinc deposit on the irregular surface, which is then finished in the regular galvanizing solution. This method also simplifies the procedure of cleaning the surfaces, inasmuch as the alkaline electrolyte necessitates much less care in cleaning. I was able to plate books and other irregular objects very evenly with this method, and even nails, etc., in the plating drum.

The adjoining figure shows a modern large nickeling

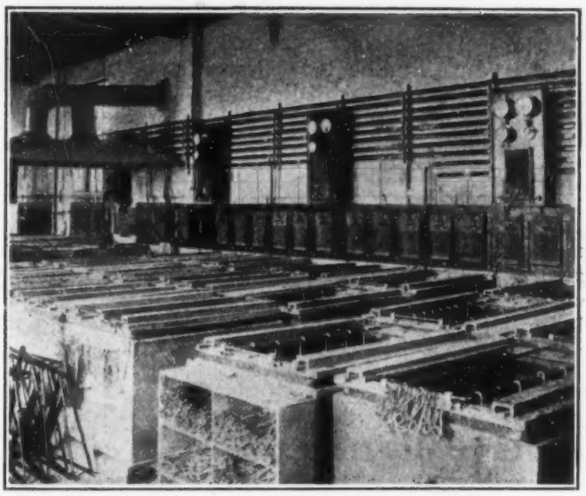


FIG. 1—MODERN GERMAN NICKEL PLATING WORKS.

establishment for bicycle parts. Power is furnished by a 220-volt direct current motor, which drives three dynamos, one of which furnishes 500 amperes at 6 to 8 volts and the other two 650 amperes at 5 volts. All four machines are coupled by elastic couplings and run at the same number of revolutions. The main switchboard is in the engine room and the current is conducted into the plating room by six pairs of copper bars. By means of this division of the current-generating units the running of the plant is very little liable to interruption and no larger factory should take its current from a single machine without having a reserve.

The 54 baths are divided into three groups, each of which has a special switch board in the plating room. The machine of 500 amperes at 6 to 8 volts has to furnish current for two quick-nickeling baths, in which especially bicycle spokes receive a strong and rust-proof coating. These spokes require a thicker deposit than is necessary for other bicycle parts, and the coating is produced in about 12 to 15 minutes with a current density of about 46 amperes per square foot. A large ventilator is arranged above these two baths, so that the room is kept entirely free of gases.

*Abstract from Metallurgie.

A modern galvanoplastic art-establishment, recently installed in London for the reproduction of objects in copper or nickel is shown in Fig. 2. The current is furnished by two alternating current motors, each of

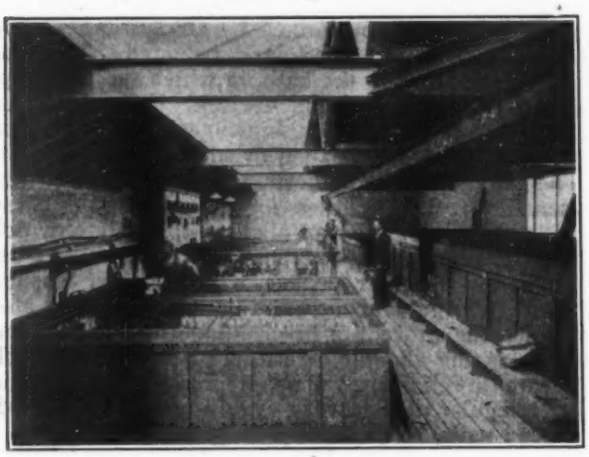


FIG. 2.—MODERN GALVANOPLASTIC ART ESTABLISHMENT.

which drives a 1,500 ampere and 3 to 3½ volt dynamo. The current can be led into the circuit alternately from one or the other machine, or both can work parallel or separately on the whole or the half of the bath circuit. Figures above life size are reproduced in the baths, each of which contains about a thousand gallons, or whole stair railings of wood or cement are covered with a layer of copper several millimeters thick (1 millimeter = 0.03937"). The bath pressure is 2 volts on an average, the current density 17 to 18 amperes per square foot of surface. Circulation of the plating solution in the baths is accomplished by means of compressed air.

DRYING IN THE HOT SAND BATH.

By Daniel Wittig.

As all castings are porous, a certain amount of moisture is retained in the metal, and after they have passed through the dips, pickles and plating solutions a certain amount of acid or alkali will remain in the pores. The latter will break out and stain the work if it is not perfectly dried. This trouble occurs especially in brass or copper plated cast iron or steel articles, and it oftentimes happens when the work has been buffed and sometimes when it has been lacquered, and causes much annoyance. Small brass or copper plated castings that are really only colored, will keep their color better and do not stain when they are dried perfectly.

The writer has found that very satisfactory results can be obtained in a hot sand bath, if the operation is performed in the right way. The following observations are intended to emphasize some practical points which have to be taken into consideration in order to obtain satisfactory results.

As far as the sand to be used for the bath is concerned, it may be remarked that any sea or lake sand can be utilized for this purpose, after it has been perfectly dried and passed through a very fine sieve in order to remove all stones, grit, etc. The mesh of the sieve should be just large enough to let dry sand run through. The sand is then put into an iron box and heated, and care has to be taken that it is always kept dry enough to run freely.

Much trouble is usually experienced from imperfect drying after the work has been plated. This statement is especially true in regard to work with crevices, castings with sand holes and small hollow articles with but a very small opening, such as metal buttons, etc. Previous to subjecting the plated articles to the heat of the sandbath, they are run through hot water. They are then shaken in order to remove all the water, after which they are immersed in the sand and covered up. Care must be taken not to get the water, etc., into the sand. A little practice will enable the operator to know how long the work must be left in the sand. Small articles will become hot and dry immediately, while larger and heavier ones will have to remain in the sand till they are hot. At all times the articles must be left till they get hot enough, so that they cannot be handled with the bare hands. After they are hot enough, they are taken out and left to cool, and then all the loose sand can be shaken off.

Special care has to be taken that the articles which are to be dried do not get too hot, as copper or brass will turn color if heated too much. With a little practice the operator will be able to know how long he has to let the different articles remain in the hot sand. Another point to which attention has to be paid is that soft metal articles and such articles which are soft soldered are not left in the sand too long, as the solder will melt when the sand is too hot. When hollow articles are too wet, they can be removed and given a few taps or jerks, after which they are again returned to the bath until they are dry. Where small articles or only a few pieces of work are to be dried, a small quantity of sand only is heated in any iron dish. An iron hook can be kept on hand to help remove the work from the sand. Slinging wires are left out of the sand so that the work can be handled. The sand is renewed from time to time.

The advantages of hot sand over warm sawdust can easily be understood. The sand keeps dry and soaks up the moisture coming out of the crevices, whereas the sawdust becomes wet, and, moreover, would burn if it was tried to get it too hot.

The treatment outlined above is not intended to be used on polished articles, but on such that are to be polished after plating or are not to be polished.

A NEW METHOD OF SILVERING GLASS.

A new method of silvering glass has recently come into use, and by means of which the glass may be readily and easily silvered. A solution of nitrate of silver is made by adding 80 grains of nitrate of silver to a pint of distilled water. Ammonia is then added drop by drop until the solution turns a milky color and then clears up like water. The solution, after standing from eight to ten hours, is filtered and a solution of 60 grains of Rochelle salt in a pint of water added. If it is desired to coat a flat surface like a mirror, for instance, the edge is covered with wax and the solution poured on and the whole exposed to the sunlight. The whole begins to turn gray and in a short time the glass will be coated. The whole is washed and the back covered with asphaltum varnish.

A new process for reducing aluminum has been patented by Walter Rubel, of Berlin, Germany, and assigned to Nathan Bernstein, of the same city. The process has been patented in the United States and consists of mixing clay with phosphate of lime, sulphuric acid, carbon, and lime and heating the mixture to a cherry red heat.

THE CASTING OF LARGE BRONZE TABLETS.

The casting of any large piece of bronze is a difficult task, and particularly so if it is to be used for ornamental work. The surface must then be without flaw or blemish, and the color good, so that the careful scrutiny of the customer will not reveal any imperfections. The casting of bronze statues is considered the most difficult work which the brass foundryman is ever called upon to do, and indeed there are very few foundries which are equipped with the appliances, knowledge or men to do this class of work. The making of a bronze tablet is not quite as difficult work as that of statue making, as the false cores are almost, if not completely eliminated, and the molding is a straightforward piece of work. The care which must be taken in the facing, the molding, and with the metal in order to obtain the necessary finish, trueness to pattern and color, makes the casting of a tablet a job which requires great care.

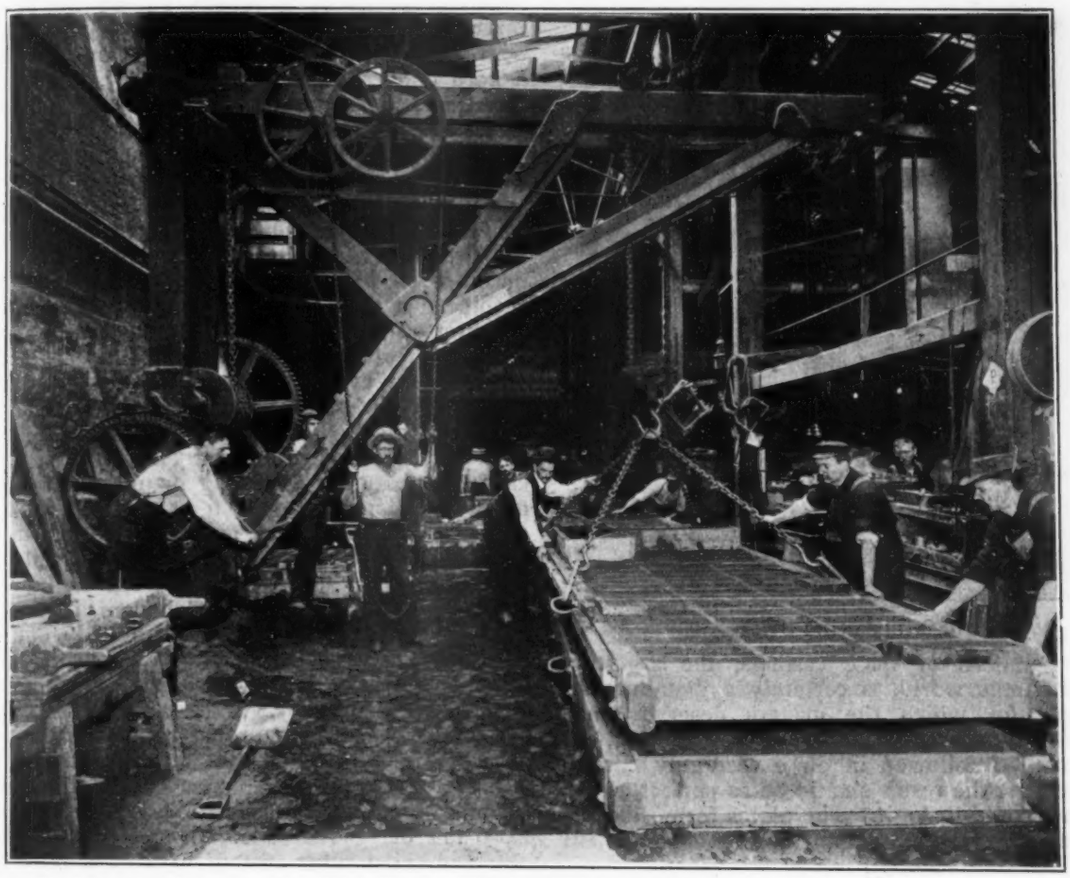


FIG. 1—CLOSING THE MOLD.

The completion of the new Williamsburg Bridge over the East River, in New York City, required tablets to commemorate the fact, and they were designed and entrusted to the William H. Jackson Company, of 29 East 17th street, to complete. These tablets are the largest of their kind ever cast, and are four in number.

Each of the tablets has a total length of 52 feet 7 inches, and a width of 4 feet 3 inches. The weight was nearly three tons. The first problem encountered was the making of the pattern, and the thickness of the pattern was only three-eighths of an inch. Special kiln-dried wood was used, and the letters, which varied in height from 3 to 9 inches, were glued in place. The need of preventing the pattern from warping was very important, and for this reason it was made in three sections and properly fastened together. The making of a pattern of this nature and of such a thinness is a severe test of the pattern maker's art.

The pouring of the metal over such a large area in a thickness of three-eighths of an inch presented a problem even greater than the making of the pattern. The enormous surface over which the metal must flow causes it to chill, and, therefore, the failure to unite with the consequent number of "cold shots." Although the sand in such a mold is dried it is of so much lower temperature that the chilling tendency is greatly manifested.

The mold was made in sections, and each flask was 25 feet long, 5 feet wide and 1 foot thick. The pattern was "gated" in 125 different places so as to allow the metal to enter the tablet in as many places as possible. The pouring was made through seven "gates." The melting and mixing the metal likewise presented a difficult problem, and was accomplished as follows: The copper was melted in crucibles in the usual coke furnace and under plenty of charcoal. When melted the tin and zinc were added, the mixture stirred and the metal poured into ingots. These ingots were melted in an ordinary cupola for the casting of the tablet, and in the usual manner by charging the cupola with coke and ingots. The cupola was of the usual

type employed in iron foundries. As the casting to be poured was so thin it was necessary to have the metal very hot, and this was readily accomplished by forcing the heat of the cupola.

The metal was tapped from the cupola into a ladle holding about 1,200 lbs., and also into crucibles. Some 1,800 lbs. were run into crucibles. The ladle was manipulated by a crane and the crucibles by hand. All were poured into gates simultaneously. In order to conduct the gases and steam away from the mold it was well vented, and from these the vapors poured in dense clouds for a minute after the cast was made.

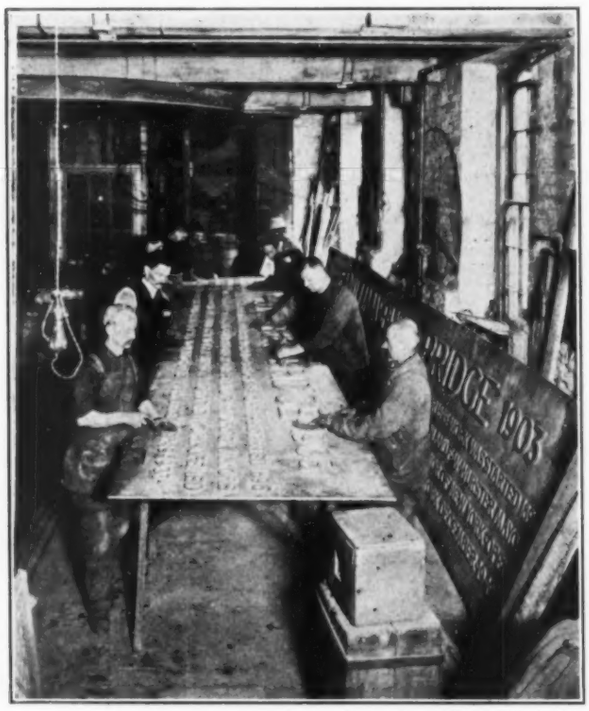


FIG. 2—CLEANING UP.

The preparations of these castings, the largest of their kind in the world, is certainly a metallurgical achievement for which the makers deserve much praise. No new process was used in their casting, but the old method followed in an exceedingly careful manner, so that the result should be as perfect as the molder's art could make it. The plates form, like the bridge which they are to commemorate, a monument to the skill of the makers.

The cheapest copper ever produced is now coming from the Wolverine mine at Lake Superior. This mine made the new low record of 6.87c. per lb. for the net cost of copper for the fiscal year ending June 30th last. The lowest cost ever made in the Lake region was the product of the Quincy mine in 1894, which made an average net cost of 5.71c. per pound.

Sulphur is not an usual constituent of petroleum and the ordinary grades are free from it. This fact is quite advantageous in the use of oil in the Swartz type of furnaces in which the metal is melted in direct contact with the fuel. In the Texas petroleum, however, sulphur exists in considerable quantities, and as much as three per cent. has been found. This contamination, therefore, would unfit the grade of petroleum for many uses.

ALLOYS OF ALUMINUM WITH SODIUM AND BARIUM.

A recent French process, as described by Helouis, Mauclaire and Mayer in the *Journal de l'Electrolyse*, has for its object the production of aluminum-barium, aluminum-sodium and similar alloys, with a view of their utilization for the production of hydrocarbons or hydrogen, as the case may be. The barium-aluminum alloy is prepared in the following manner: A mixture is made of 25 lbs. of dioxide of barium, 13.2 lbs. of aluminum filings and 11 lbs. of carbon. Two pounds of this mixture is introduced into a graphite crucible and the operation is started by the ignition of a starting mixture composed of 10 grams (about 1-3 oz.) of a mixture of barium peroxide and aluminum in powder form. Sodium peroxide and aluminum powder can also be used. The combustion is kept up by gradually adding the rest of the mixture in small quantities of 1 to 1¼ lbs. After the operation is finished the mass is allowed to cool and a hard and compact block is finally obtained, which has the curious property of giving off large sparks when struck with a hammer.

This block is divided into small pieces, which, however, do not possess yet the property of being decomposed by water. But after about a dozen days a profound chemical transformation is brought about, and the product, which has then become friable, can be decomposed by water after the fashion of calcium carbide. It then produces an abundant evolution of carburetted hydrogen. The residue unattacked by water is treated with a solution of caustic soda, after which a new evolution of carburetted hydrogen takes place until the residue is dissolved completely.

If it is intended to prepare an alloy which is to be used for the production of hydrogen, the process is carried out in the following manner: 22 pounds of more or less pure aluminum in the form of filings or granules are put into a magnesia brick crucible. A mixture of 6½ lbs. of dioxide of barium and 2¼ lbs. of aluminum is also prepared, which is, however, not explosive inasmuch as the aluminum is not in the form of a fine powder, but of granules. The ignition is brought about as outlined above, and there is produced throughout the whole mass a non-carburized aluminum-barium alloy, which after a few days possesses the remarkable property of furnishing nearly pure hydrogen when in contact with water. For the manufacture of hydrogen 600 lbs. of the aluminum-sodium alloy are treated with 4,900 lbs. of water and 2,050 lbs. of caustic soda. In this manner there are obtained 9,450 cubic feet of hydrogen and 7,480 lbs. of aluminate of soda solution of a density of 30° Bé. The latter can be utilized as such in the arts. It is claimed that while chemically pure hydrogen weighs 89 grams (about 3 oz.) per cubic meter (35.14 cubic feet), the hydrogen obtained in the above manner weighs about 93 grams (about 3 1-7 oz.). On the other hand, the hydrogen which is obtained, as is done usually in the arts, by acting with sulphuric acid on metallic iron, weighs 160 grams (nearly 6 oz.) per cubic meter, and is therefore inferior to that obtained in the process described above.

The Presidential campaign is consuming considerable metal in the form of all sorts of Presidential souvenirs. Manufacturers report that the campaign souvenir craze promises to be greater than ever before.

A PUMP FOR MOLTEN METAL.

It is usually supposed that pumps are limited in their use to liquids which are at the ordinary temperature or only a small amount above it, but such is not the case. Melted metal of some kinds may be as readily pumped as water. The use, however, is confined to the low melting metals and alloys such as tin or lead or their alloys.

The pump is particularly applicable to the manufacture of babbitt metals or type metals and obviates the need of using a hand ladle. As the metal may be pumped from the bottom the result is a material free from dross or other foreign matter. In the accompanying sketch a pump for pumping such metals and alloys is illustrated. The metal pump cannot be called new, but that illustrated is one of excellent design and gives good results. As it obviates the need of dipping out the metal with a ladle and pouring into the mold by hand, the advantage may readily be appreciated. The apparatus is described in the subsequent remarks.

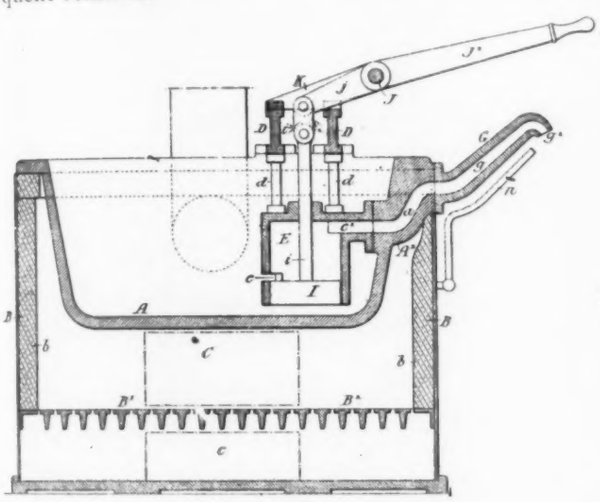


FIG. 1.

Fig. 1 is a longitudinal sectional view of a melting pot, furnace and pump. A is the melting pot, made in the form shown and mounted upon a suitable casing B, in which is a grate B', forming a fire chamber C under the pot and an ash pit, *c*, under the grate. Suitable doors are provided and a smoke flue extends from the combustion chamber.

While it has been shown a construction in which coal or wood is used as a fuel, it will be understood that gas or oil may be used if desired. The furnace is preferably lined with fire brick, *b*. The melting pot A is of such a size as to hold a considerable amount of metal, as it will be understood that the use for which the appliance is intended is to cast large shapes with a single pouring of soft metal.

DD are two beams which extend from one side to the other of the melting pot, and suspended from the beams by posts *d* is a cylindrical pump casing E, open at the bottom and closed at the top. This pump casing has at the lower end an unobstructed inlet opening *e* and at the upper end an unobstructed outlet opening *e'*. This outlet opening communicates with an unobstructed passage through a throat *a* in a portion A', preferably formed integral with the melting pot A.

Secured to the melting pot is a neck G, preferably curved as shown and having a throat *g*, forming a continuation of the throat *a* and terminating in a spout *g'*, which is so designed as to discharge into a mold which is adjusted directly under it.

Snugly fitting the cylindrical pump chamber E is a plunger I. This plunger has a rod *i*, which passes through an opening in the upper end of the casing and is attached to links *i'*, which in turn are pivoted to an arm *j*, attached to a rock shaft J, mounted on bearings on the *f* frame K, secured to the cross beams D. The bottom of the pump cylinder or chamber E is, it will be observed, near, but sufficiently above the bottom of the melting pot to permit the free flow of molten metal, underneath the cylinder, whereby it may have access to the underside of the piston or plunger I and whereby the inlet *e* may be brought as near to the bottom of the pot and as far below the normal level of the molten metal in the pot as possible.

Secured to the rock shaft J is a long operating arm J', having a suitable hand-hold. By pressing down upon this operating arm the plunger will be raised, closing the supply opening, and the plunger will then force the molten metal which is in the pump chamber out through the discharge opening and through the neck to the mold. The parts are so proportioned that by gradually pressing down the arm, a steady stream of metal will be transferred from the pump chamber through the neck of the mold.

In order to heat the neck G, a gas pipe is arranged *n* directly under the neck, as shown, and this pipe is perforated with small holes so that a series of jets will play upon the neck and thoroughly heat it. The gas jets are not absolutely necessary when the metal is being poured, but are used to heat the neck prior to casting.

It will be noticed that the inlet to the pump chamber is considerably below the normal level of the molten metal in the melting pot. By this means only pure metal will be transferred from the pot to the mold, the dross usually upon the surface of the metal being avoided, and by making the cylinder open at the bottom the molten metal in the pot materially aids the plunger to lift the metal in the cylinder.

The operation of the mechanism is as follows: A suitable mold is placed in position directly under the outlet opening of the neck G. One form of mold is made in two parts and curved so that the casting is made to fit a large cylinder press. If used for casting type metal the matrix for an entire page of a newspaper is placed in position in the mold and the mold adjusted to receive the molten metal. The furnace being previously heated, the type metal in the pot is in a molten condition. The cylinder pump chamber being below the level of the molten metal in the pot is also heated to such a degree that metal will readily flow into and out of the chamber, so that when the operating arm J' is raised, the plunger I will be depressed to open the interior of the pump to the melting pot and the molten metal will flow into the chamber. Then by pressing down upon the operating arm the plunger will be raised, closing the inlet opening and gradually forcing a quantity of molten metal from the pump chamber through the neck and into the mold. As the metal flows in a steady stream it will prevent any unevenness in the casting.

The pump is preferably of such a size that one lifting of the plunger will fill the mold, although in very

large castings two or more operations may be necessary to fill the mold.

After the casting has been made the mold is opened, the casting removed and the mold adjusted again to receive another charge. In some instances the plunger may be operated by power, in which case a crank shaft may be connected to the lever or directly to the plunger rod, or a hydraulic cylinder may be used to operate the plunger without departing from the general method.

THE MANUFACTURE OF SPONGY LEAD.

A process for manufacturing spongy lead has been invented by J. H. Mercadier, of Louvres, France, which is quite novel in its application. This invention relates to a process for manufacturing spongy lead specially intended for the construction of electric accumulators, but which may also be used for any other manufacturing purpose.

This novel process consists in incorporating in a suitable manner a suitable metal oxide with molten lead when the latter is cooling. The mode of operation is as follows: A certain quantity of molten lead is located in a receptacle and then gently stirred by means of an iron fork—for instance, one preferably grown rusty—or a wooden fork or the like. This stirring is for the purpose of preventing the lead from thickening on and sticking to the walls of the receptacle. At the same time that the stirred lead is cooling it is powdered, and especially near the edges of the receptacle, with a metal oxide, such as litharge or minium or oxide of zinc or a mixture of these oxides. For certain applications other metal oxides and even ashes may be used. When the lead begins to become pasty, the receptacle is placed over a slight flame, and then begins the most important stage of the process of manufacture. During the whole of this stage the pasty mass of lead is stirred or, better still, kneaded by means of the stirrer, while the lead is being continuously powdered with the oxide or a mixture of oxides, which is located for that purpose in a box pierced with holes. The pastry lead thus closely mixed with the oxide cannot solidify in a compact mass. If the operation has been well performed, including the powdering, there is obtained when solidification has taken place a lump or mass of lead full of an infinite number of cavities and of veins, which render it extremely spongiose and capable of being rapidly penetrated by aquæ acidulæ. The lead is not in a state of powder, but of filaments, which are soldered together, leaving interstices between them. The lump of spongy lead thus obtained is so resisting that it does not become disaggregated even under the action of a rolling-mill. It can be put in the form of plates to serve as accumulator-plates, and in this case the use of an armature of ordinary or hardened lead is not necessary to give to the plates the required rigidity, for the spongy lead is sufficiently strong of itself.

In the preparation of the novel product in the manner described when the addition of oxide and the kneading are thought to be sufficient the matter is thrown quite hot into a mold in order to give it the desired shape or form.

If solidification comes on before the kneading is over, one has only to increase the intensity of the flame under the receptacle to again reduce the lead into a fluid state, and then the mixing and the kneading are progressively continued and completed.

In the application to electric accumulators the plates of spongy lead obtained by the present process do not require a long preparation and can be used almost immediately on being taken out of the mold, while giving at the same time excellent results, for the oxides which are formed within the mass of the plates are well maintained and do not become disaggregated.

CASTING OF COPPER AND BRASS.

In a patent recently issued in Germany, Prym states that he has observed that the splitting of cast copper or brass bars and plates, when they are being worked into wires or sheets, takes place if the castings have been made in molds in which they could cool off evenly from both sides. This is attributed to the formation of crystals from the outside towards the middle of the cast material, which gives rise to a weak place in the middle, at which point the material splits during drawing and rolling. He proposes to overcome this defect by using molds which are filled with molding sand on one side, while the other side is formed by a water cooled plate. It is claimed that a nearly vertical position of the plate is essential for the successful performance of the casting operation. The crystallization then takes place evenly from the water cooled side towards the other.

Such a mold is shown in the adjoining figures and consists of a support a, which carries a plate b of iron

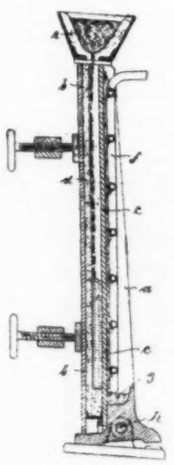


FIG. 3.

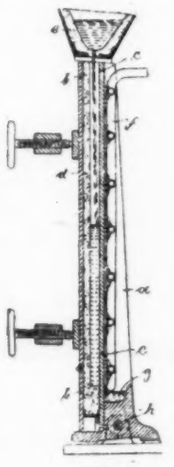


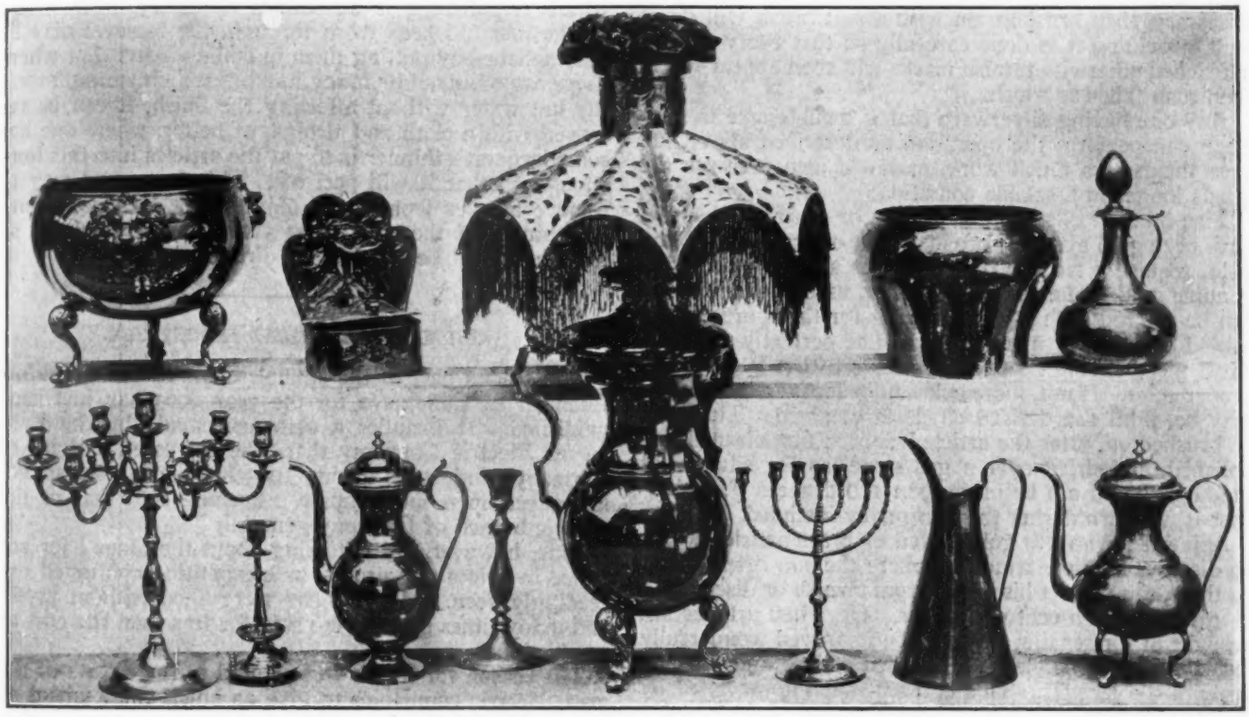
FIG. 4.

or other suitable material. At a certain distance from the latter is arranged a plate c, preferably of copper. The plate b is covered on the inside of the mold by a layer d of sand or similar non-heat-conducting material. The pouring funnel e is located above the mold and it is preferably made so large that it can take the whole amount of material which is necessary for the object to be cast. A system of cooling pipes, f, through which water is circulated, is provided in contact with the plate c, which water can be sprinkled directly on the plate, as shown in the illustration. A trough g collects the water and carries it off. It is, of course, necessary to support the plate c in such a manner that it can expand freely in all directions. The whole frame is movable at the bottom about a shaft h.

The mold is shown partly filled in Fig. 3. As the mold is inclined towards the left, the metal strikes the sand, and, flowing down alongside of the latter, accumulates from the bottom up, and the solidification begins when it touches the plate c. If the mold is filled about half the weight of the cast metal is inclined to press into the layer of sand and in order to obviate this the plate is brought to the position shown in Fig. 4. The weight of the metal rests then on the plate c. The openings in the pouring funnel e have to be placed in such a position, however, that the metal as it is poured in does not strike the plate c before it reaches the surface of the metal which is already in the mold.

RUSSIAN ANTIQUES IN BRASS AND COPPER.

Every one familiar with the metal industry knows what enormous quantities of brass and copper are continually worked up into metal goods by the use of machinery. In fact, nearly all of the metal goods that are produced in the United States are what might be termed "machine made." The drawing press, the drop press, the turret lathe and automatic machinery built for nearly every requirement produces metal articles by the thousand and ingenious Yankees are constantly inventing new machinery which will produce more. An exception to the general rule of machine goods is found in a few shops which reproduce the antiques. In this class of art metal work hand labor produces the results and the few machines that are used at all are confined to spinning and polishing lathes. The rest is left to the skill of the hand and the eye.



REPRODUCTIONS OF THE RUSSIAN ANTIQUES.

The samples of art metal work shown in the engraving are of hammered brass and copper and are manufactured in the Russian brass shop of Joseph Weintraub, 197 Grand street, New York City. Mr. Weintraub is a pioneer in the business having carried on the work for twenty years and finds that to-day his products are more popular than ever, being sold in all the leading stores from Maine to California. The designs of the goods are generally oriental, though many of the articles have been adapted to modern American needs, such as lamp shades, electric light work and umbrella stands. It is interesting to note that there is a close resemblance between the Russian shapes and designs of antiques and what is generally termed the colonial style of fine metal ware. All of the goods are very highly finished and polished, and some of them are beautifully chased. The workmen who turn out this fine class of metal work are Russians to a man. In fact the whole shop has air of the land of the Czar. The forefathers of some of the workmen have been engaged in metal work for centuries and they are expert chasers and hammerers and take great pride in their workmanship.

At the present time there are 75 men employed in the Weintraub shop alone, all busy reproducing antiques and as many of the articles are of large size, a considerable amount of brass and copper, particularly brass is consumed in the form of castings, sheet, rod, wire and tubing. The cut shows but a few of the variety of articles which are manufactured, among which may be mentioned candle sticks, lantern lamps, shades, candelabras, sconces, loving cups, ewers, beer mugs, tankards, wine pitchers, vases, jardinieres, fern dishes, umbrella stands, coal hods, fire log boxes, and irons, door knockers and snuffers. Also special designs in brass and copper, and for any purpose are made to order. The popularity of the goods again emphasizes the growth of the American taste for brass and copper art metal work.

COPPER AND TYPHOID BACILLI.

That copper is a destroyer of typhoid bacilli is one of the recent discoveries of scientists. Attempts have recently been made to use it in the reservoirs of Washington, D. C., in order to stamp out the typhoid fever which is now prevalent in the city. It was proposed to hang bags containing blue vitriol upon the stern of a boat and carry them around the reservoir. The suggestion resulted in controversy between the health officers and physicians as to whether the cure might not be worse than the disease. In the discussion which followed the fact that copper is good for certain intestinal troubles was disclosed. One physician stated that he had used it for some time for such a purpose. It is said that the Chinese use copper kettles for keeping away the "cholera-devils."

THE USE OF LACQUER.

To obtain good results in the lacquering of silver the lacquer must be pure white and should be heated to about 110 degrees F. during the drying. As all other objects to be lacquered, it is necessary to produce a fine polish on the burnished parts, or if frosted, it should be scratch brushed so that the finish on both, the plain and the frosted, is the best obtainable. Good results can only be obtained when the goods are absolutely clean and free from finger marks.

Articles that are burnished in a perfect manner, so that they require no buffing, will lacquer much nicer than pieces that have been finished with the buff. The buffing gives the surface a somewhat greasy surface which shows through the lacquer when finished. Where one has no oven for drying purposes, it is best to dry over a gas burner, over which is laid a sheet iron, hanging the objects a few inches above the plate. This method dries the lacquer quicker and gives a better finish than a closed oven. In dipping the articles into the lacquer secure complete covering, but if one has not the amount of lacquer necessary, then brushing on with a soft brush will do as well, providing it is done carefully so that every portion is reached otherwise tarnish marks will soon appear where the brush failed to touch.

Any one having silverware that is troublesome to keep clean can perform the operation as described above and save themselves much work, and will also preserve the goods longer in a salable condition.

Fine brass clocks, picture frames, or other articles that have been gold plated or are made out of brass resembling gold, require a lacquer that produces a color resembling genuine gold. The colorless lacquer, used for silverware, can be colored with a gold coloring for that purpose. It should be carefully mixed so it will be perfectly even. A small piece should be tried first to see that it gives the proper color. If not, more coloring or lacquer, as the case may be, until the desired shade is obtained. This may be brushed on, after the article has been first cleaned and polished, and dried over a gas stove, as for silver; but the heat should not be more than 110 degrees F.; otherwise it will turn darker than originally intended.

A jeweler who has gold plated or brass articles which he displays in show windows where the sun often shines on them, can protect his goods from tarnish or discoloring by giving them a coat of lacquer. Or, when articles are brought in for repairs, they can be improved wonderfully in looks if they be cleaned, polished a little and touched up with the lacquer. This is often much appreciated by many customers.

Articles which are finished in oxidized, old silver, French gray, or butter finish, are mostly stained, and to retain their finishes they must be well covered with lacquer which should be baked in an oven. The color of the lacquer on these finishes may be light, but a little coloring does not affect it in any way. In stores where this finish of goods becomes a little worn or soiled from frequent handling, the relacquering may be done without the removal of the old. Should articles of the mentioned finishes, especially in the larger pieces, be exposed to the air for some time, they lose their gloss and become unsightly by the tarnish. It is therefore necessary to have the object well lacquered before the tarnishing appears.

Polished brass articles are not always the same color, owing to the different alloys used to produce the brass suitable for different purposes. For a chandelier, for instance, that is composed of many parts, the lacquers must be colored in such a manner that the finished parts are all of the same color. This requires considerable skill and experience in the manipulation of the colors. The intention, in nearly all cases, is to have the brass finished articles to resemble gold as nearly as possible. A well lacquered brass articles to keep clean and as the lacquer holds well to the brass for years it makes brass practical to use where it could not be if it had to be constantly cleaned.

The relacquering of old brass articles may often be advantageously preceded by the following dip which gives the metal a bright and new appearance. Strong sulphuric acid, two parts; water, 1 part; red fuming nitric acid, 1 part. Mix in the open air, and stir with a glass rod. The bright gilded effect produced on the brass by this mixture is so good that any one trying it will not return to the use of plain nitric acid. The subsequent washing, drying and lacquering cannot be done too soon after the dipping.

To remove lacquer from articles is sometimes difficult, not that the lacquer can be gotten off, but the difficulty is to remove it without injuring the pieces by discoloring so that repolishing is necessary. The cheapest way is to put in hot potash; this is done where pieces are to be repolished, particularly on brass. For silver or gold articles, where re-polishing is sometimes necessary, only where the lacquer has been worn through, the removal may be accomplished by putting them in boiling water, but where there are oxidized or fancy finishes which cannot stand the hot water without affecting the finish, it can be removed with a cloth and alcohol, or better, where one has some lacquer,—thinner is to put the articles into this long enough so that it will peel off. This is a good way to remove lacquer from many objects. It does not injure the thinner if the pieces are previously washed off so that there will be no dust or dirt on them.

GERMAN ELECTRICAL INDUSTRIES.

The second part of the annual report of the Frankfort Chamber of Commerce for the year 1903 has just been published. It includes a statement made by the Lahmeyer Electric Company that "the increased activity of Germany's industries during 1903 has had a corresponding effect upon the company's business and that of the electric branch of Germany generally."

This, however, did not bring about the longed-for advance in prices and profits, as competition continued exceedingly keen. Many orders were filled without profit, and many times goods were sold for less than the cost of production.

The reason for this is to be found in the efforts of the great electric companies to give as much employment as possible to their plants, which had been considerably extended and enlarged.

Another cause was "the competition arising from the growth of native electric industries in many foreign countries which heretofore had been profitable markets for German electric goods. The strong efforts made by these domestic electrotechnical works to crowd out German supplies compelled German exporting concerns to offer exceedingly low terms in order to maintain their footing in these foreign countries. The high price of raw materials was also an obstacle under the above-noted business conditions. The prices of some of the raw materials advanced toward the close of the year; among these were copper, brass, and dynamo wire. Owing to the establishment of a trust the price of incandescent lamps has been raised 50 per cent."—*Richard Guenther, Consul-General, Frankfort, Germany.*

About all the metal factories of Bridgeport, Conn., are running on full time, and there appears to be a general air of prosperity.

ANOTHER EYELET COATING MACHINE.

This machine is used by the Atlas Tack Co., of Fair Haven, Mass., who also make eyelets as well as tacks. It is intended for coating eyelets, used on shoes, with japan or similar substances. In the ordinary method of doing this work the eyelets are coated by means of rolls. The funnel-shaped throats of the eyelets, shown in Fig. 2, are apt to become clogged by this method and thus an uneven deposit is produced. This company found, however, that the throat may be cleared by a blast of air and an uniform coating produced. The blast of air is the essential part of the process.

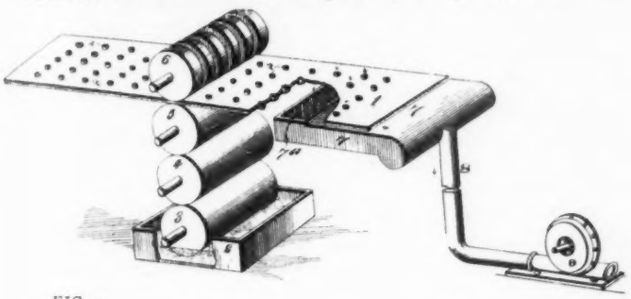


FIG. 1.

EYELET COATING MACHINE.

The method is as follows: By referring to Fig. 1 it will be seen that the eyelets are inserted in a sheet of material. This is of paper and eyelets are forced into it rather snugly.

Three rolls are used, and the lower roll, "3," runs in the japan and the other rolls carry it to the eyelets. The top roll is grooved so that the upper ends of the eyelets do not come in contact with it. The lower part, or the heads, come in contact with the roll "5." The heads of the eyelets thus become coated. The board containing them next passes to the chamber "7" and air is forced up through. The japan then becomes evenly distributed. By this method a thicker and more even coat may be obtained than is possible with the usual method.

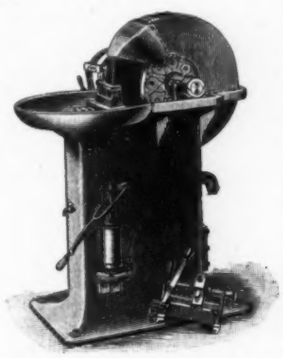
One of the uses for the non-ferrous metals in the rolling stock of the New York Subway is the lining of the steel cars, with sheet aluminum.

Through the absence abroad and elsewhere of the members of the American Aluminum Association there will be no regular meeting of the aluminum people this year. Informal talks may be held at St. Louis.

In the September number of THE METAL INDUSTRY we announced the formation of an Italian Company, at Rome, Italy, for the manufacture of aluminum, and our latest advices report that the company manufacture various products by electrochemical processes. The company owns large fields of bauxite, and it is believed that they will be able to market aluminum at a very low figure, as labor is cheap and their bauxite mines are said to be extremely rich. There are reported to be other Italian bauxite fields awaiting the arrival of the investor and developer.

BRIDGEPORT GRINDER.

In the October number of THE METAL INDUSTRY there was shown a new form of wet grinder which by the use of a second wheel immersed in water the grinding wheel was dampened sufficiently to prevent the overheating of tools. At the same time the grinder was not wet enough to injure the face of the wheel. In the water tool grinder shown in cut the water supply is regulated very simply and ingeniously by the use of an air pump. The column of the grinder is divided into two compartments, upper and lower, the lower holding the water out of reach of the emery wheel when it is not in use. When in action any desired quantity of water may be readily applied by a few strokes of the air pump, which puts an air pressure on the top of the water, forcing it up through a tube into the upper chamber. By this means the tools to be ground are kept at a low temperature. This grinder is manufactured by the Bridgeport Safety Emery Wheel Company, of Bridgeport, Conn., who also make special grinding machinery and motor driven buffing lathes.



COMBINATION HOIST.

One of the latest forms of Yale & Towne hoists is the "Triplex" block and Fairbanks Suspension Scales shown in cut. This combination is designed to weigh materials as they are being hoisted and transferred, thereby saving the time and labor of handling twice. It is especially adapted for use in mills, foundries, shipping rooms, etc., and it is believed would be found particularly useful in large brass factories. The ease, speed and safety of the Yale & Towne "Triplex" block is well known and the Fairbanks Suspension Scale is noted for accuracy, durability and simplicity. The hoist is marketed by the Yale & Towne Manufacturing Company, of Stamford, Conn., with general offices at 9 Murray street, New York City.

CORRESPONDENCE DEPARTMENT

In this Department we will answer questions relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York

Q.—A firm writes that they are having trouble with pinholes in their castings, particularly with candlesticks. They have noticed in THE METAL INDUSTRY that the best method to prevent them is to add a small amount of phosphor-tin to the mixture and inquire what per cent gives the best results.

A.—You do not give us your mixture and therefore it is not possible to give more intelligent information. Your trouble is probably due to a small amount of oxide of tin and the province of the phosphorus is to reduce the latter. The mistake is frequently made to add too much phosphorus and we would caution you against that. We should think that ½ lb. of phosphor-tin containing 5% of phosphorus to the 100 lbs. of the mixture would be sufficient in your case. However, you have to experiment a little to find out the exact amount best suited to your requirements.

Q.—The same subscriber informs us that they are having trouble in the plating room in having the silver strip from the goods after plating. Their idea is that if the goods were chemically clean before plating this would not happen, and they ask for some information as to the cause of this stripping.

A.—It is, of course, absolutely necessary in order to obtain uniform results in plating, to have the goods as clean as possible before plating, and the cause you mentioned may be at the root of the trouble. It may, however, be that a large excess of cyanide is present in your bath, in which case the silver deposit is also very liable to strip. You might test your bath and ascertain whether this is the case, and remedy the defect. Silver deposits are also very difficult to get to adhere when plating on a brightly polished surface.

Q.—A subscriber advises us that he is having trouble with oxidized silver name plates for caskets. They look all right till the engraver starts to engrave them, but then they peel.

A.—You do not tell us what particular process you use for oxidizing. We assume, however, that you use a liver of sulphur solution. It is a fact that has been repeatedly mentioned in THE METAL INDUSTRY, that it is quite difficult to get an even, adherent coating. If you use a weak solution, the latter should be as fresh as possible, and the surface of the object to be oxidized should be scrupulously clean. A solution recommended by some people contains 1-5 oz. of liver of sulphur and 1-3 oz. of carbonate of ammonia to the pint. It is used boiling hot and the objects are immersed until the desired color is obtained. The successful performance of the operation requires a good deal of practice.

The use of a concentrated solution of liver of sulphur also demands a good deal of practice for successful execution. It is heated to boiling and after the objects have been cleaned as carefully as possible and rinsed off in water, they are quickly dipped into the solution. They are quickly withdrawn and rinsed off in water, and the operation is repeated once or twice until the desired color is obtained. You might try the application of platinum chloride, using a solution of one part of the latter salt to 100 parts of water. A solution of this strength gives good results, inasmuch as the color develops slowly and can be better controlled than is possible when a stronger solution is used. Alcohol may be substituted for water in making up the solution and it has been found that a more even deposit is obtained in the latter case. Consult THE METAL INDUSTRY 1903, p. 85, where you will find all the necessary directions as to the right way of applying the solution.

Q.—A maker of solder wishes to learn of a process for removing antimony, arsenic and copper from lead. He obtains much impure material and cannot use it in the manufacture of solder.

A.—The method generally employed for the removal of these impurities from lead is to melt it and then constantly stir it so that the other metals oxidize, float to the surface as dross and may be skimmed off. An iron kettle may be used, which holds a ton or so, and the stirring or agitation done by hand or propeller wheel of iron rotated by power. It will be found that the arsenic and copper will come to the surface as dross (which may be sold) and the lead gradually purified.

Q.—A subscriber asks about recasting aluminum for rolling. The kind of crucible to use, the mold, and whether any fluxes should be used.

A.—In melting aluminum the ordinary graphite crucible is used, as it answers well. No special mixture of crucible material is needed, as the regular brass mixture is satisfactory. As for molds, those used for casting other metals for rolling, *i. e.*, iron molds are used. No oil or other material should be used on the surface. A slight coating of graphite is useful. No fluxes or charcoal should be used. Charcoal is particularly bad, as it mingles with the metal and cannot be skimmed off. It may be said that sheet scrap cannot be recast so that it will roll into sheet. The reason for it is the fact that the oxide is heavier than the metal and mingles with it. All sheet aluminum scrap is put into sand castings and not back into rolling mill plates, as no one has yet been able to recast the aluminum so that it will roll.

Q.—A hollow ware maker says that he is having trouble with blow-holes in the casting of a mixture of lead and antimony in the proportion of about 100 pounds of lead to 8 to 12 of antimony. When the castings are cleaned up ready for plating and struck up in silver the blow-holes appear and cannot be obliterated. After plating the parts do not have a good appearance.

A.—It is probably the dross which enters the mold that does the harm. This foreign matter enters and cannot be seen until the plating is commenced. Perhaps your metal is too hot or your gate too large. Try smoking your molds if you have not done so. Oil will do this also if present. If your metal is at the proper heat and the molds are well made, we can see no reason why you should not obtain good castings. Try using new lead and antimony if you are not already doing so. Possibly you are buying antimonial lead already mixed, which is liable to run very "drossy." The best makers use new metals for particular work.

READERS' OPINIONS.

Correspondence is solicited from all of our readers on subjects relating to the founding, finishing and plating of the non-ferrous metals and alloys. Name and address must be given, though not necessarily for publication. Address THE METAL INDUSTRY, 61 Beekman street, New York.

To the Editor of THE METAL INDUSTRY:

I notice in your correspondence department you have frequent inquiries for a remedy for the spotting out of plated work such as cast iron, spelter and the soft metal alloys. Having had a number of years' experience in the plating of metal goods of various kinds, allow me to suggest a remedy I have used with unfailing success for a number of years. While giving Mr. Dan Wittig due consideration for his suggestions in the preceding issue of THE METAL INDUSTRY, I would say, that stoveing is not always successful. The trouble is caused mostly from the metallic cyanides in the pores of the metal. We know cyanides absorb moisture and this is where the trouble comes in. I have seen brass plated goods spot through the lacquer when they have been heated for five hours at a temperature of 150 degrees or more. For remedy I use a solution of Plater's compound commonly known as whale oil soap, 1 or 2 oz. to the gallon. This I have in an iron tank with an outlet, which tank is heated with exhaust steam to the boiling point. I take any of my plated goods, iron, spelter or lead alloys that have a chance of spotting out, pass them through cold water as usual, hang them in the soap solution 10 or 15 minutes, then wash them in cold water, and then pass them through boiling water, after which they are ready for the polishing room.

The above is not the only use I have for this solution. As it is neutral to test paper and therefore has no action on the plated metals, I use it for a drying-out solution for all class of work. I wash as usual and then immerse for an instant and rinse in boiling water. This immersion puts an invisible coating of grease on the goods, thereby preventing oxidization, when goods are left unpolished and lacquered for days. I use a solution of this kind in connection with my brass dipping department and its value is of much importance, as it costs so little and accomplishes so much. Dipped brass goods, whether strung on wires or basket dipped, need very little drying material to absorb the moisture. If there is any one of your subscribers who will take the trouble to rig up a solution of this description, he will find it of much value. Of course, it needs replenishing to keep up its strength, but requires only very little soap each day.

C. H. PROCTOR.

The Goldschmidt Chemical Company, of Essen, Germany, have protested before the Board of United States General Appraisers against the classifying of thermit as a chemical product and dutiable at 25 per cent. The importers are now trying to secure refunds of part of the duty paid on the basis of its being a non-manufactured article dutiable at 20 per cent. It is said the decision of the appraisers will have no effect on the future price of the article, as a factory is to be established in the United States for the manufacture of thermit.

CANADA'S NEW ROLLING MILL.

The Canada Brass Rolling Mill Company, of Toronto, Canada, have their new plant equipped and are ready to roll metal. The promoters and proprietors of this mill believe that it is a beginning which will ultimately end in a brass manufacturing business in the Dominion of Canada similar to the industry that has developed in the United States. They hope that a number of cutting-up shops will follow the establishment of the mill and that they will grow into prosperous industries. There are six million of people in the Dominion to be supplied with brass goods, and the Canada mill expects to supply a share of the brass sheet necessary for this consumption. At the present time the company will roll only sheet, but later will take up the manufacture of rod, wire and tubing. Ferdinand Deming, who has been identified with the brass industry of the United States for many years and who has installed and started brass working plants in various parts of the world is superintendent of the new Canada mill. R. E. Menzie is president of the company. The rolling mill machinery was built by The Waterbury Farrel Foundry & Machine Company, of Waterbury, Conn.

A Naugatuck Valley Rolling Mill superintendent says that he now confines his reading to the New Testament, The New York Tribune and THE METAL INDUSTRY by which he is kept straight, morally, politically and technically.

A new form of rectangular riddle has been put on the market by The Adams Company, of Dubuque, Iowa. By being oblong instead of round it is said the new riddle avoids dropping sand outside of the flask.

THE ELECTRIC SMELTING AND ALUMINUM CO.

On September 29 the Electric Smelting and Aluminum Company, of Cleveland, O., acquired the business, plant and equipment of The Cowles Electric Smelting and Aluminum Company, of Lockport, N. Y., the latter company having operated for the past nine years as licensee under the patents of the Cleveland company. The business at Lockport will be continued with the advantage of additional capital, better facilities, etc., for conducting the manufacture of the various alloys of aluminum, silicon, manganese, copper, sale of aluminum, etc., as heretofore. The Electric Smelting and Aluminum Company is practically formed of the same stockholders as the old Cowles Company, and with added capital and with the other strong companies allied with them as licensees, the new company expects to be of greater service to the public than in the past.

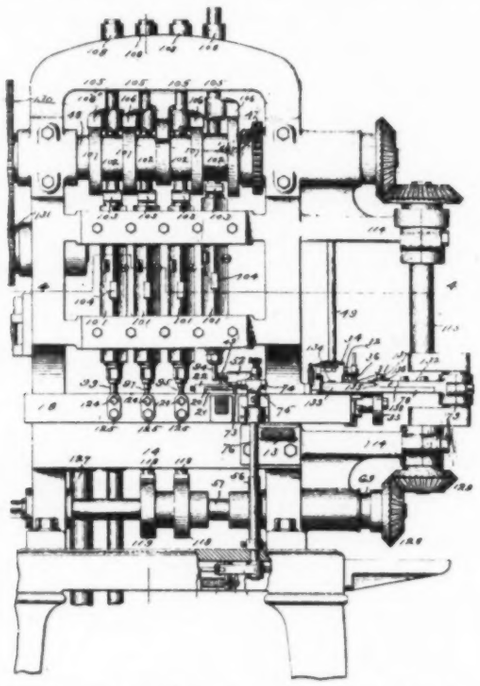
A NEW CRUCIBLE WORKS.

Edgar B. Seidel, who has had an experience of thirty years in the manufacture of crucibles, is establishing a crucible plant at Waterbury, Conn., which he hopes to have in operation by December 1. Mr. Seidel bought property in the heart of the city a short distance from the New York, New Haven and Hartford Railroad station and is putting up a two-story addition 32 x 80 feet and a kiln which is located in the center of the addition. The kiln will be 20 feet in diameter and 55 feet high. The works will be equipped with every improvement known in the manufacture of crucibles. Mr. Seidel has had experience in building a crucible plant, having put up one at Tacony, Pa., and he expects to improve on his former work. The new plant will be known as the Waterbury Crucible Company, though the managing and principal owner will be Mr. Seidel. The company is independent of all other concerns.

PATENTS

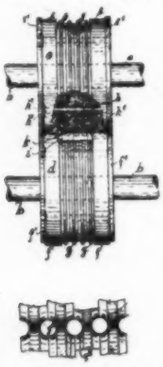
A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

768,876. Aug. 30, 1904. EYELET-MACHINE. Andrew C. Campbell, Waterbury, Conn., assignor to the E. J. Manville Machine Company, Waterbury, Conn., a corporation of Connecticut.—An eyelet-machine having a frame, a die-bed with dies supported by the frame, punches supported by the frame above the dies,



mechanism for reciprocating the punches, mechanism for feeding a strip between the blanking-die and punch, a reversible guide for guiding the strip over the blanking-die, and mechanism for transferring the blanks transversely from die to die, substantially as specified.

767,268. Aug. 30, 1904. MACHINE FOR COVERING WIRE WITH RUBBER OR THE LIKE. Conrad Felsing, Jr., Coepenick, Germany. —In grooved rollers for covering wire with rubber or the like, the combination of two lateral flanges, and a series of grooved



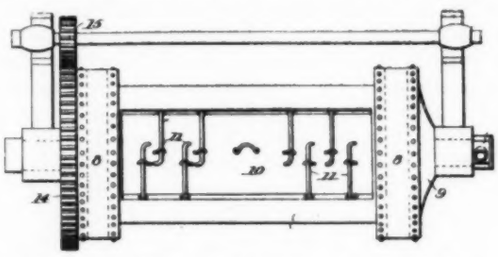
disks disposed between said lateral flanges, each individual disk being formed of a projecting annular surface to each side of which is adjacent an annular congé or concave quarter-round, substantially as set forth.

762,547, June 14, 1904. PROCESS OF ENAMELING STEELWARE. Henry C. Milligan, Canton, Ohio. The process herein described, of enameling articles of steel or homogeneous iron, which consists in pickling the same to produce a clean surface then thoroughly washing the same to remove the pickle; then drying the cleaned article; then immersing it in a weak acid solution and while in a wet condition coating the same with alkaline-liquid enamel; then drying said enamel coating, and finally fusing the same in a muffle.

768,938. Aug. 30, 1904. POLISHING-BAG. Joseph L. Guyon, Chicago, Ill., assignor of one-half to Raymond E. Durham, Chicago, Ill.—As a new article of manufacture, a bag of closely-

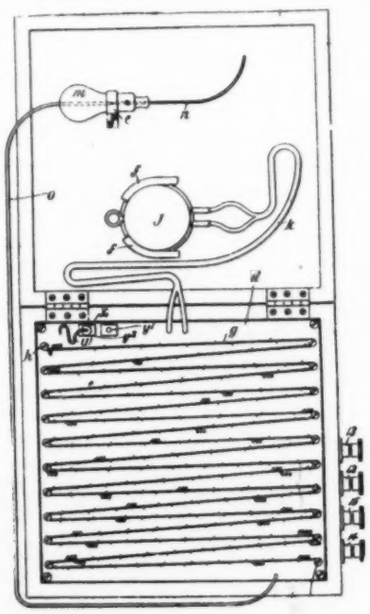
woven fabric and a filling therefor composed of whiting and sawdust mixed in substantially the proportions set forth.

769,192. Sept. 6, 1904. RUMBLE. William W. Sly, Cleveland, Ohio.—A rumble comprising a cylindrical body having a door



therein, and an enlarged end constructed to receive enlarged ends of articles placed in the rumble.

769,364. Sept. 6, 1904. PYROMETER. Henry M. Tory and Howard T. Barnes, Montreal, Canada.—In an instrument for measuring temperature the combination of a pyrometer containing a coil and loop; a calibrated contact and a second contact adapted to be brought into electrical connection with same; a



normally open main electric circuit having its terminals connected to said contacts and forming two paths which respectively include the coil and loop of said pyrometer; a resistance-coil located in each of said paths; a supplemental resistance-coil in one of said paths; and a telephone-circuit connected with said main circuit, substantially described.

TRADE NEWS

When You Have Any Trade News of Interest Send It to THE METAL INDUSTRY, 61 Beekman Street, New

C. W. Moore, who has established a metal business in Bridgeport, Conn., reports a very active trade.

J. L. Dolgoff, a metal smelter of Bridgeport, Conn., reports that business is fair and is picking up.

The F. B. Shuster Company, of New Haven, Conn., report increasing orders. They look forward to an active trade.

The Waterbury Farrel Foundry, of Waterbury, Conn., is at the present time manufacturing machinery for Germany, England and the Orient.

Besides their plant in Montreal, the Syracuse Smelting Works have offices and branches in New York city, Seattle, Wash., and San Francisco, Cal.

The Wolverine Brass Works, Grand Rapids, Mich., suffered a loss by fire during October, but this did not in any way delay the filling of orders.

A. H. Wells & Co., manufacturers of brass tubing at Waterbury, Conn., report that their dull season seems to be over with and that business is very good.

Henderson Brothers, of Waterbury, Conn., manufacturers of polishing and washing barrels, report that business was never better with them during a Presidential year.

E. B. Badger & Sons Company, Boston, Mass., recently filled a naval contract for 1,200 Badger fire extinguishers to be used by the different navy yards of the United States.

The Electric Storage Battery Company, of Philadelphia, Pa., are issuing a neat memorandum book of convenient size and which contains information and data for engineers.

The Waterbury Brass Company, of Waterbury, Conn., report an increasing trade in jewelers' brass, such as platers' metal, etc. They are now building an addition to their rolling mill.

The Humphreys Manufacturing Company, Mansfield, Ohio, issued recently a revised catalogue showing their line of brass and iron pumps for hand and power use, also their cylinders.

After a somewhat slack period during the summer the rolling mill of The Seymour Manufacturing Company, of Seymour, Conn., is now running on full time. A specialty of this mill is high-grade German silver.

Business has braced up considerably during the past month with the Bridgeport Chain Company, of Bridgeport, Conn. It now looks as if they would do as much business this year as last, which was a record year.

The Bridgeport Deoxidized Bronze and Metal Company, of Bridgeport, Conn., report that they have work enough to keep them busy until June, 1905. They make brass, bronze and aluminum castings.

Eugene H. Ferree, who has manufactured aluminum novelties at Lockport, N. Y., for a number of years, intends to also make brass novelties and recently made a trip to the brass district of Connecticut preparatory to taking up his new line.

A new brass foundry at Waterbury, Conn., is that of Charles Overton, who has established a foundry alongside of the New York, New Haven and Hartford Railroad. Mr. Overton was formerly a foreman in Holmes, Booth & Haydens.

The Emmelmann Brothers Manufacturing Company, of Indianapolis, Ind., have brought out a new form of a combination gasoline soldering iron and blow torch, which is suitable for jacks-of-all-trades.

The American Fixture and Manufacturing Company, of Troy, Ohio, have been incorporated with a capital of $20,000 to manufacture gas and electric fixtures, also to deal in electric supplies and do construction work.

The Perkins Machine Company, of Warren, Mass., which have been working night and day on an order from the Japanese Government, report that they have finished their work and the presses have been shipped.

The work of reconstruction at the plant of The Coe Brass Manufacturing Company, Torrington, Conn., is nearly completed. The betterments include new boilers, machinery, etc., which will render the plant more efficient.

The Ansonia Brass and Copper Company, of Ansonia, Conn., have about completed an order for nearly 2,000 tons of copper cable ordered by the Mexican Light and Power Company for a power plant at Necaxa, Pueblo.

The Robertson Manufacturing Company, of Buffalo, N. Y., have recently issued a number of circulars showing their gas engine, circular saws, tool grinders and power saws, all of which are of interest to metal workers.

The Empire Wire Company announces that they have discontinued their New York office and their headquarters in the future will be at their factory, Rome, N. Y. All orders will receive the same careful attention as heretofore.

The Falkenau-Sinclair Machine Company, Philadelphia, Pa., have been building some new machinery for the Brooklyn Navy Yard, New Jersey and New England parties, consisting of a testing machine, toggle presses and standard presses.

In order to consolidate their two brass foundries the Eaton, Cole & Burnham Company, of Bridgeport, Conn., are putting up a small addition to their old iron foundry. When finished all brass moulders, core makers, etc., will be under one roof.

The S. Obermayer Company, of Cincinnati, O., manufacturers of foundry facings and foundry supplies, have been awarded the highest award and gold medal at the St. Louis Exposition, on plumbago, foundry facings and foundry supplies of all kinds.

The Oregon Plating and Machinery Works, Oregon, Ill., have organized and their plant is now in successful operation. The officers are: President, W. E. Cleveland; vice-president and superintendent, John A. Pettey, and secretary and treasurer, Charles M. Gale.

The Franklin Moore Company, of Winsted, Conn., are issuing a descriptive folder of their Acme chain hoists. The company state that by their various improvements on hoists, the lifting cost is reduced to the minimum and the necessary exertion of the operator greatly lessened.

The Rome Manufacturing Company, of Rome, N. Y., have let the contracts for an additional two-story factory building 40 x 120 feet. The company manufacture tea kettles, range kettles, tea and coffee pots, wash boilers and a full line of copper and brass specialties and nickel plated ware.

The Wire Goods Manufacturing Company, Oklahoma City, Oklahoma, have been incorporated with a capital stock of $30,000 by F. M. Gault, J. H. Hess and R. H. Wilkins. The company will manufacture a general line of wire goods and will soon be in the market for wire machinery.

One of the most attractive exhibits in the Palace of Varied Industries at the St. Louis Fair is the display of Landers. Frary & Clark, New Britain, Conn. The firm have a booth of architectural beauty in which are placed handsome mahogany cases filled with the best examples of the cutler's art.

About the middle of November The E. J. Manville Machine Company, of Waterbury, Conn., expect to move into their new building. The company report that they have as finely equipped machine shop as any in New England and their building and equipment represents an investment of $125,000.

The Empire Brass Works, Stroudsburg, Pa., have been incorporated with a capital of $50,000 by J. Morrison Gilmour, of New York city, and William A. Gilbert, W. Burnett Easton, A. Mitchell Palmer and Finley R. Porter, of Stroudsburg. The company will, in the future, have more to say about their work.

The annual meeting of the stockholders of the Peck, Stow & Wilcox Company was held at Southington, Conn., July 28. The usual quarterly divided of 2 per cent. was declared, with an extra dividend of 2 per cent., making 10 per cent. for the year on a capital stock of $1,250,000. Much gratification was expressed at the favorable showing.

The Niagara Falls Metal Stamping Works, Niagara Falls, N. Y., successors to the Metal Stamping Company of the same city, have begun work on a two story brick building, 60x104 feet, which is to be completed by December 1st. The equipment will be up-to-date, and the factory will turn out a varied range of press, die and machine work.

Mr. Robert Pierce, of 496 Broadway, New York City, is organizing a company to manufacture art metal goods, and desires the catalogues, circulars and price lists of brass and copper rolling mills who manufacture metal for this purpose. Also catalogues of machine builders which build machinery suitable for working sheet metal in metal goods.

The international jury of the Louisiana Purchase Exposition has awarded The Westinghouse Companies twelve grand prizes, eight gold medals, four silver medals and one bronze medal for their various exhibits at the World's Fair. The list of awards is said to be one of the longest and most comprehensive ever received by associated interests at a world's fair.

The Hoyt Metal Company have partly completed their new eastern plant at Perth Amboy, N. J. The new Western factory, at Granite City, Ill., is finished and in running order. The two plants will have a daily capacity of 750 tons. The Hoyt Metal Company report that they are the largest manufacturers of alloys in the world. They also manufacture sheet lead and shot.

The Charles Graham Chemical Pottery Works, of 988 Metropolitan avenue, Brooklyn, N. Y., manufacture every description of stoneware required by the metal worker and plater. They issue a nicely illustrated catalogue showing their complete line of acid-proof vessels and apparatus. Also a special circular describing the Graham stoneware exhaust fans for handling acid vapors.

Since they started to manufacture dipping baskets of aluminum some two years ago, Edward F. Smith & Co., of New Haven, Conn., report that they now sell more dipping baskets of that metal than any other. The company also make these baskets in brass and copper but the aluminum basket withstands to best advantage the action of acids used in plating. Besides dipping baskets, the firm manufacture, in all metals, riddles, sieves and other wire goods.

A keg of nails was sent to John Hassall, manufacturer of all kinds of escutcheon pins at 171 Elm street, New York city. When Mr. Hassall opened the keg he found a copy of THE METAL INDUSTRY used as packing and was so pleased with it that he immediately sent a subscription to the publisher. Mr. Hassall evidently had a greater sense of the fitness of things than the sender of the keg of nails.

The Indiana Brass and Iron Bed Company, of Marion, Ind., have bought the entire buildings, grounds and machinery of the Butler Iron Bed Works, of Moorseville, Ind., and after the 1st of the year will operate at Moorseville, which is a suburban town of Indianapolis and gives better railroad facilities. The plant purchased is an entirely new one and the company are enlarging it. The office and show room will be at Indianapolis.

The Aluminum Cooking Utensil Company, of Pittsburgh, Pa., have issued an announcement of a change in the prices of their ware. Twenty-seven pieces which they sell have been reduced in price and the prices of twenty-nine pieces advanced, the actual difference in prices of the entire list being only 15 cents. The company found that some goods were quoted too low, others too high, and they have equalized quotations. The prices have been reduced on some of the agents' best selling articles.

The Bridgeport Hardware Manufacturing Company, of Bridgeport, Conn., have let contracts for a new building two stories high and of 104 x 183 feet. They will put in a 150-h. p. Corliss engine, a new equipment of machinery and tools and the addition will give them three times the floor space which they had in their former factory. The present policy of the management is to enlarge their business as rapidly as possible and to gradually make a higher grade of goods, discarding their cheaper lines.

The Searls Manufacturing Company, of Newark, N. J., have brought out a fine line of brass candlesticks which are suitable to carry and for ornamental purposes. The candlesticks are made in polished lacquered brass or in nickel plate. Other brass and nickel plated goods manufactured by the Searls Company are a variety of holders for whisk brooms, matches, toothbrush, soap, comb, sponges, towels and other metal goods which are used in the household and bathroom. Their line is well designed and nicely finished.

On another page will be found the advertisement of the Heræus LeChatelier Pyrometer, which is sold in the United States by Charles Engelhard, 41 Cortlandt street, New York city. This pyrometer is for measuring temperatures between 0 and 1,600 degrees celsius, equal to 2,920 degrees Fahrenheit. It is exact, durable, easy to understand and to handle and moderate in price and has been successfully used in establishments for the manufacture of metals, particularly for annealing and for molten metals. Besides pyrometers, Mr. Engelhard also sells patented electrical furnaces and quartz glass articles for experimental and laboratory use.

A series of blotters have been issued by the Rockwell Engineering Company, 26 Cortlandt street, New York city, the backs of which are illustrated with half-tone cuts showing their furnace in operation and also containing pat expressions and actual results obtained in using the Rockwell furnace. One cut shows a furnace in operation which is daily turning out 4,500 pounds of yellow brass mixture. Another shows a gate of buckles which were cast from a mixture melted in a Rockwell furnace. There were 1,080 of the buckles (40 to the pound) cast in snap moulds, three gates to the mould, poured flat, and only three bad castings. On another blotter is printed the recommendation of a customer. The Rockwell Engineering Company report a continued success with their furnace.

Metal Prices, November 2, 1904

METALS

	Price per lb.
TIN—Duty Free.	
Straits of Malacca	29.20
COPPER, PIG, BAR AND INGOT AND OLD COPPER—Duty Free. Manufactured 2½c. per lb.	
Lake	14.00
Electrolytic	13.85
Casting	13.50
SPELTER—Duty 1c. per lb.	
Western	5.40
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.40
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons	7.50
Hallets	7.25
Other	7.00
NICKEL—Duty 6c. per lb.	
Large lots	40 to 50
Small lots	50 to 75
BISMUTH—Duty Free	$1.50 to $2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars	$0.59
PLATINUM—Duty Free	19.00
GOLD—Duty Free	20.00
QUICKSILVER—Duty 7c. per lb. Price per Flask.	40.00

Zinc—Duty, Sheet, 2c. per lb.; 600-lb. casks, 6.90 per lb., open, 7.00 per lb.

Tobin Bronze—Rods, Unfinished, 19c.

Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots	16½c.
Phosphor Bronze, Ingots	15 to 18c.
Silicon-Copper, Ingots	34 to 36c.

OLD METALS

	Buying.	Selling.
Heavy Cut Copper	12.00c.	12.50c.
Copper Wire	11.25c.	12.00c.
Light Copper	10.50c.	11.00c.
Heavy Mach. Comp	10.25c.	10.50c.
Heavy Brass	8.00c.	8.50c.
Light Brass	6.25c.	6.50c.
No. 1 Yellow Brass Turnings	6.75c.	8.00c.
No. 1 Comp. Turnings	8.50c.	9.00c.
Heavy Lead	4.00c.	4.25c.
Zinc Scrap	3.75c.	4.25c.
Scrap Aluminum, sheet, pure	**22.00c.**	**25.00c.**
Scrap Aluminum, cast, alloyed	**16.00c.**	**20.00c.**
Old Nickel	**15.00c.**	**25.00c.**
No. 1 Pewter	20.00c.	21.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	18	19	19	19	19	20
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	19	19	20
	Longer than 96 ins.	18	19	19	19	19	21
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	18	19	19	19	19	21
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	19	19	21
	Longer than 96 ins. Not longer than 120 ins.	18	19	19	19	20	22
	Longer than 120 ins	18	19	19	20	21	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	18	19	19	20	21	23
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	20	22	24
	Longer than 96 ins. Not longer than 120 ins.	18	19	19	21	23	27
	Longer than 120 ins.	18	19	20	22	25	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	18	19	19	20	22	25
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	21	23	28
	Longer than 96 ins. Not longer than 120 ins.	18	19	20	22	25	
	Longer than 120 ins	19	20	21	23	27	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	18	19	20	22	27	
	Longer than 96 ins. Not longer than 120 ins.	18	19	21	24	29	
	Longer than 120 ins.	19	20	22	27		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	19	20	22	25		
	Longer than 96 ins. Not longer than 120 ins.	20	21	23	26		
	Longer than 120 ins.	21	22	24	28		
Wider than 108 ins.	Not longer than 132 ins.	22	23	25			
	Longer than 132 ins.	23	24	27			

Rolled Round Copper, ⅝ inch diameter or over, 21 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, November 2, 1904

COPPER BOTTOMS, PITS AND FLATS

Net Cash Prices.

14 oz. to square foot, and heavier, per lb.	23c.
Lighter than 10 oz.	24c.
10 oz. and up to 12 oz.	26c.
12 oz. and up to 14 oz. to square foot, per lb.	29c.

Circles less than 8 in diam., 2c. per lb. additional.
Circles over 13 in. diam., are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order.
Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.23	$0.27	$0.31
Above No. 10 to No. 16..	.23½	.27½	.31½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 40 per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 18c. per lb.
Seamless Copper Tubing, 21c. per lb.
For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBIN Iron Pipe Sizes.

Iron Pipe size.....	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.....	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

												Per lb
Plain	Round	Tube,	¾	in.	up	to	2	in.,	to No.	19,	inc.	$0 35
"	"	"	5/8	"	"		¾	"	"	19,	"	36
"	"	"	½	"	"		5/8	"	"	19,	"	38
"	"	"	3/8	"	"		½	"	"	19,	"	41
"	"	"	¼	"	"		3/8	"	"	19,	"	48
"	"	"	1/8	"	"		¼	"	"	19,	"	65
"	"	"	¾	"	"		1/8	"	"	19,	"	1 06
"	"	"	1/8	"	"		¾	"	"	19,	"	1 50
			1/16				1/8					

Smaller than ⅛ inch..... Special
2 inch to 3 inch, to No. 19, inclusive..... 38
3 inch..... 40
Over 3 inch to 3½ inch..... 45
Over 3½ inch..... 50

Bronze and copper advance 3 cents. Discount 30 per cent.

PRICE LIST FOR SHEET ALUMINUM

PLATE AND SHEET PRICE LIST.—B. & S. GAUGE.

Prices are for 50 pounds or more at a time. Less quantities, 5 cents per pound additional. Charges made for boxing.

Wider Than.. And Including	6 in. to 14 in.	14 in. to 16 in.	16 in. to 18 in.	18 in. to 20 in.	20 in. to 24 in.	24 in. to 30 in.	30 in. to 36 in.	36 in. to 40 in.	40 in. to 45 in.	45 in. to 60 in.	50 in. to 55 in.	55 in. to 60 in.	Polishing One Side.	Sat. Fin. without Lacquer. One Side.
No. 13 & heavier..	42	44	44	44	44	47	47	47	48	48	49	50	2	6
14	43	44	44	44	44	47	47	47	48	48	49	50	2	6
15	43	44	44	44	44	47	47	47	48	48	49	50	2	6
16	43	44	44	44	44	47	47	47	48	48	49	50	2	6
17	43	44	44	44	44	47	47	47	48	48	49	50	2	6
18	43	44	44	44	44	47	47	47	48	48	49	50	2	6
19	43	44	44	44	44	47	47	47	48	48	49	50	2	6
20	43	44	44	44	44	47	47	47	48	48	49	50	2	6
21	43	44	44	44	44	47	47	47	48	48	49	50	2	6
22	43	44	44	44	44	47	47	47	48	48	49	50	2	6
23	43	44	44	44	44	47	47	47	48	48	49	50	2	6
24	43	44	44	44	44	47	47	47	48	48	49	50	2	6
25	43	44	44	44	44	47	47	47	48	48	49	50	2	6
26	43	44	44	44	44	47	47	47	48	48	49	50	2	6
27	43	44	44	44	44	47	47	47	48	48	49	50	2	6
28	43	44	44	44	44	47	47	47	48	48	49	50	2	6
29	43	44	44	44	44	47	47	47	48	48	49	50	2	6
30	43	44	44	44	44	47	47	47	48	48	49	50	2	6
31	43	44	44	44	44	47	47	47	48	48	49	50	2	6
32	43	44	44	44	44	47	47	47	48	48	49	50	2	6
33	43	44	44	44	44	47	47	47	48	48	49	50	2	6
34	43	44	44	44	44	47	47	47	48	48	49	50	2	6
35 & 36	43	44	44	44	44	47	47	47	48	48	49	50	2	6
37 & 38	43	44	44	44	44	47	47	47	48	48	49	50	2	6
39 & 40	43	44	44	44	44	47	47	47	48	48	49	50	2	6
.008" to .0015"	43	44	44	44	44	47	47	47	48	48	49	50	2	6
Less than .0015"	43	44	44	44	44	47	47	47	48	48	49	50	2	6

	3 in. to 12 in. in coils.	Not wider than 6 in.
No. 13 & heavier..	43	42
14	43	42
15	43	42
16	43	42
17	43	42
18	43	42
19	43	42
20	43	42
21	43	42
22	43	42
23	44	42
24	44	42
25	44	42
26	44	42
27	44	42
28	44	42
29	46	42
30	46	42
31	46	42
32	50	42
33	50	42
34	50	42
35 & 36	52	42
37 & 38	54	42
39 & 40	55	42
.008" to .0015"	67	66
Less than .0015"	—	—

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in.
All columns except the first are for Flat Rolled Sheets.

Discounts as follows are given for sheet orders over 200 pounds.

200 to 1,000 pounds				10	per cent. off list.
1,000 to 2,000	"	10	per cent. and	2	" "
2,000 to 4,000	"	10	" "	3	" "
4,000 pounds and over		10	" "	5	" "

Sheets polished or satin-finished on both sides, double the price for one side.

Price Per Foot of Seamless Aluminum Tubing.

(CHARGES MADE FOR BOXING.)

Outside Diameter in Inches.	THICKNESS OF WALL IN STUBS' GAUGE. No. 12.	No. 14.	No. 16.	No. 18.	No. 20.	No. 22.	No. 24.	Outside Diameter in Inches.
1-4.....	.....	.....	.....	10	9	8	7	1-4
5-16.....	.....	.....	.....	11	9	8	7	5-16
3-8.....	.....	.....	.....	12	9	8	7	3-8
1-2.....	.....	.....	17	14	11	9	8	1-2
5-8.....	.....	.....	21	16	13	12	.....	5-8
3-4.....	.....	.....	25	19	16	14	.....	3-4
7-8.....	.....	.....	28	22	18	16	.....	7-8
1.....	.....	.....	30	25	21	19	.....	....1 00
1 1-4.....	.....	.....	36	30	25	.....	.....	.....1 1-4
1 1-2.....	.....	52	43	35	28	.....	.....	.....1 1-2
1 3-4.....	.....	60	50	41	33	.....	.....	.....1 3-4
2.....	84	68	58	47	37	.....	.....	.....2 00

Discount 20 to 30 per cent.

ALUMINUM

Drawn Rod and Wire Price List.—B. & S. Gauge.

Diameter B.& S.G'ge.	0000 to No.10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., three cents off list.
30,000 lbs. and over, four cents off list.